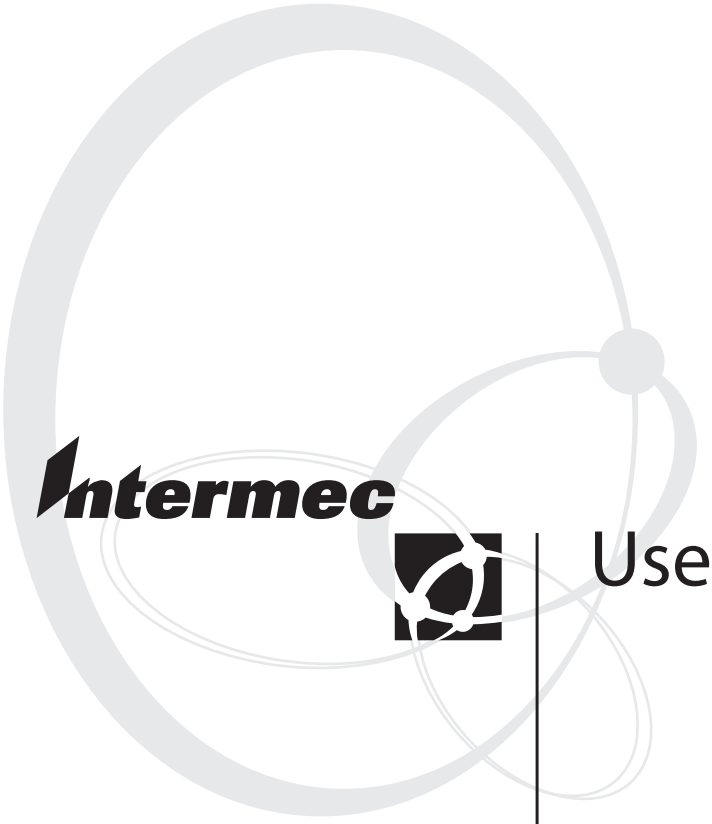

Intermec

User's Manual

Twinax Interface

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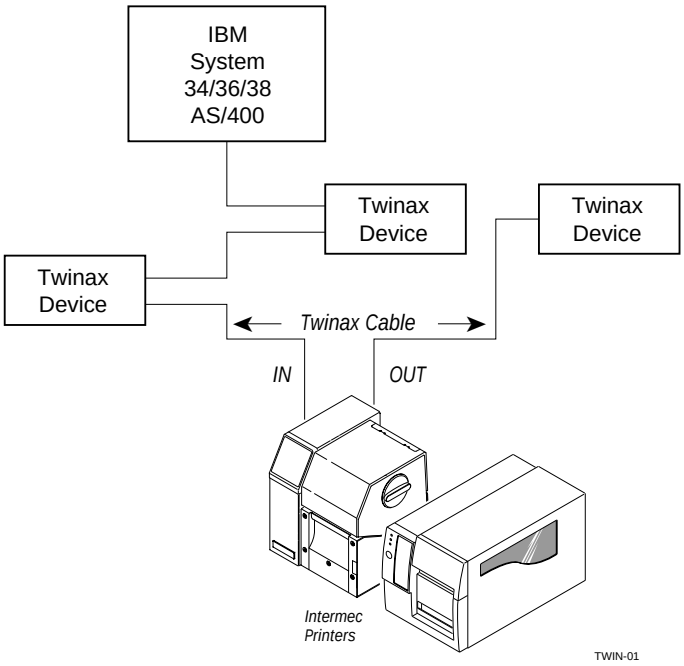
Introduction to the twinax interface

This user's manual describes how to use an Intermec printer with a twinax interface adapter in an IBM twinax cable system. The twinax interface enables the printer to operate with an IBM System/34, System/36, System/38, or AS/400 host computer. With the twinax interface, your Intermec printer emulates an IBM 5256 Model 1 printer. Host-to-printer commands are sent from the host computer to the twinax interface. The twinax interface converts EBCDIC/IBM twinax protocol into ASCII/Intermec printer protocol.

The following figure illustrates how an Intermec printer with twinax interface fits into an IBM twinax system.

Twinax interface system relationship

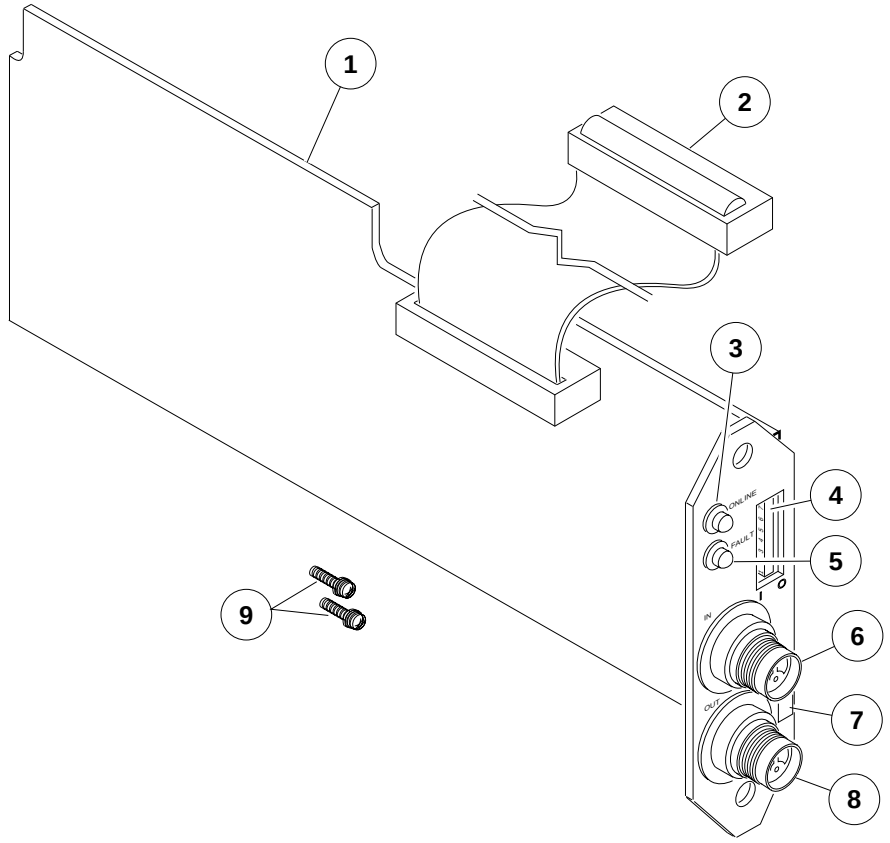


Twinax interface parts and function

The following table describes the twinax controls and indicators illustrated in the figure on the facing page.

Number	Name	Description
1	Twinax interface card	Provides the twinax interface that allows other IBM compatible devices to be serially connected to the printer.
2	40-pin accessory cable	Connects the twinax interface to the printer CPU PCB assembly.
3	Online light	Flashes or stays on to indicate the twinax interface is communicating with the host computer or system controller.
4	Rear panel switches	Enable or disable the twinax interface self-test.
5	Fault light	Flashes or stays on to indicate there is a problem with the twinax interface or the commands received by the twinax interface. Pulses (comes on for one second and then goes out) to indicate that a message is being recorded in the error log.
6	Twinax in connector	Connects the printer to the twinax system.
7	Terminate switch	Switch selectable load provides proper termination when the twinax interface is at the end of the twinax cable.
8	Twinax out connector	Connects the twinax interface to the printer CPU PCB assembly.
9	Mounting screws	Secure the twinax interface to the printer.

Twinax interface with parts labeled



***Note**: Intermec does not provide twinax interface cables.*

Preparing the twinax interface for operation

The twinax interface has been installed in your printer at the main manufacturing plant or by a field service technician. Before you can use the twinax interface with your Intermec printer, you need to do the following:

- Connect the twinax interface to your host computer.
- Set up twinax communications.
- Understand the meanings of twinax interface status lights.
- Test for communication with the host.

Connecting the twinax interface to your system

With a twinax interface installed, your Intermec printer can connect directly to a host computer through the twinax in connector. Other IBM compatible twinax devices can connect to the host through the twinax out connector.

Providing twinax interface cables

Intermec does not provide a twinaxial cable for you. You need to purchase a twinaxial cable equivalent to IBM Part No. 7362267 or 7362062. The maximum cable length allowed for the twinax interface is 5000 feet (1525 meters).

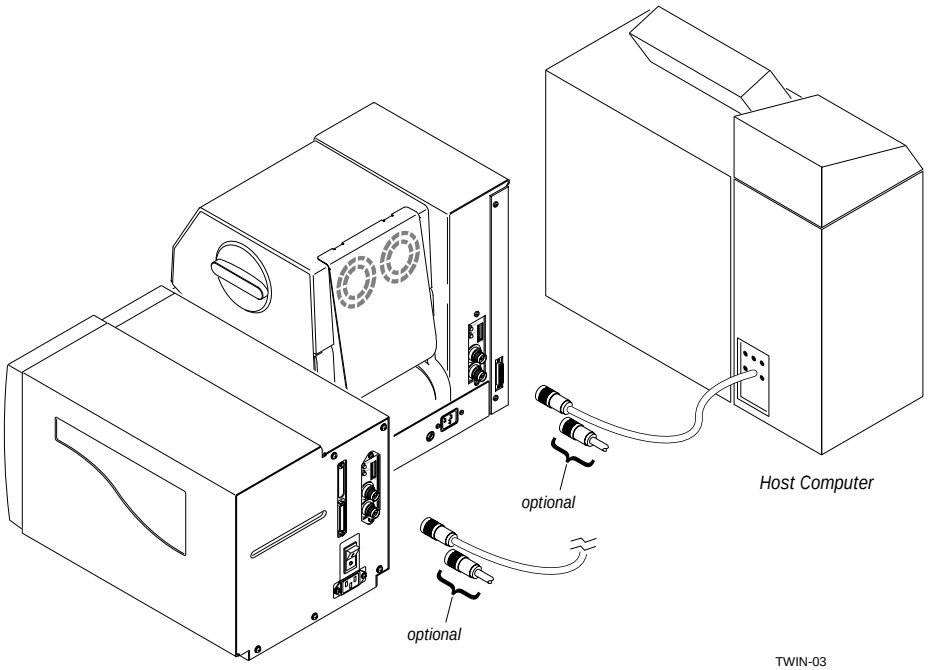
The twinax in connector attaches the twinax interface to a host computer. It can also attach to the out connector of another twinax device attached nearer to the host on the twinax cable system. The twinax out connector allows other IBM compatible twinax devices to be connected to the system cable without the need for a tee connector. The out connector requires the same twinax cable and connector assembly that the in connector uses.

When you use the out connector on the twinax interface to connect other devices to the system, be certain that the slide switch on the twinax interface rear panel is set in the up (unterminated) position. If the twinax interface is the last device or the only device on a cable, the out connector is not used. When this is the case, the slide switch on the twinax interface rear panel must be set in the down (terminated) position.

Connecting the twinax interface to your host computer

Using the twinax cable described in the preceding section, connect the twinax interface to your host computer according to the figure below.

Connecting the twinax interface to your host computer



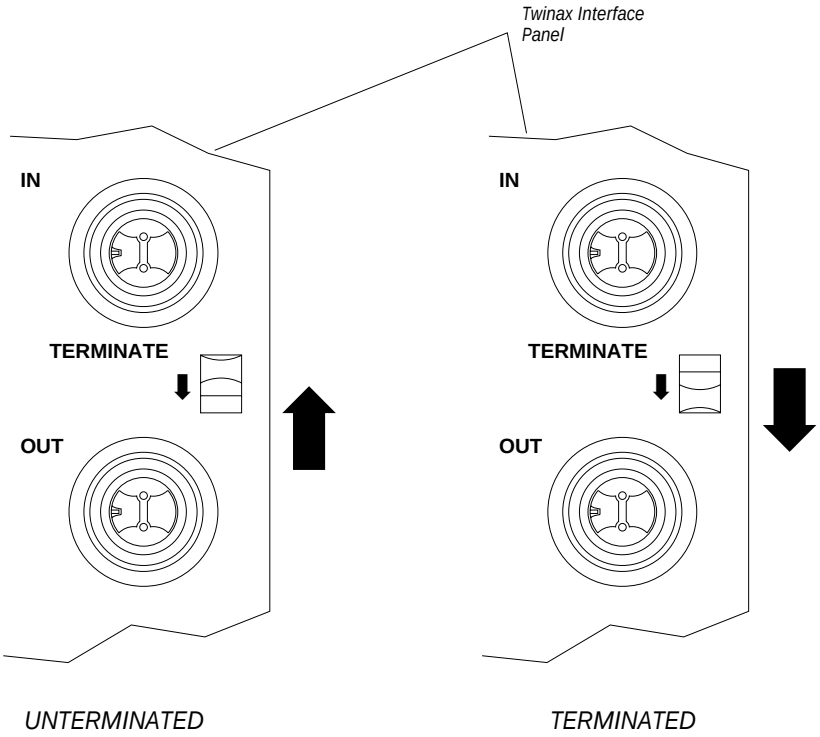
Note: *The serial port on the printer rear panel remains active after the twinax interface is installed. To ensure trouble-free operation, do not connect any computing device to this port while you are operating the printer through the twinax interface. The other computing device may transmit messages to the serial port that interfere with messages sent to the printer through the twinax interface.*

Terminating the twinax cable

When the printer is the last device on the twinax cable, the twinax interface rear panel slide switch should be set to the terminate position to designate that the twinax cable ends at the printer. The twinax cable should not be terminated at the printer when other devices are connected to the host through the twinax interface. The twinax interface disables the out connector when the slide switch is set to terminate the twinax cable. The twinax interface is shipped from the factory with the slide switch in the up position (unterminated).

To terminate the twinax cable at the printer, set the slide switch as shown in the figure below.

Setting twinax termination



Setting up twinax communications

To run your printer with the twinax interface installed, you need to do the following:

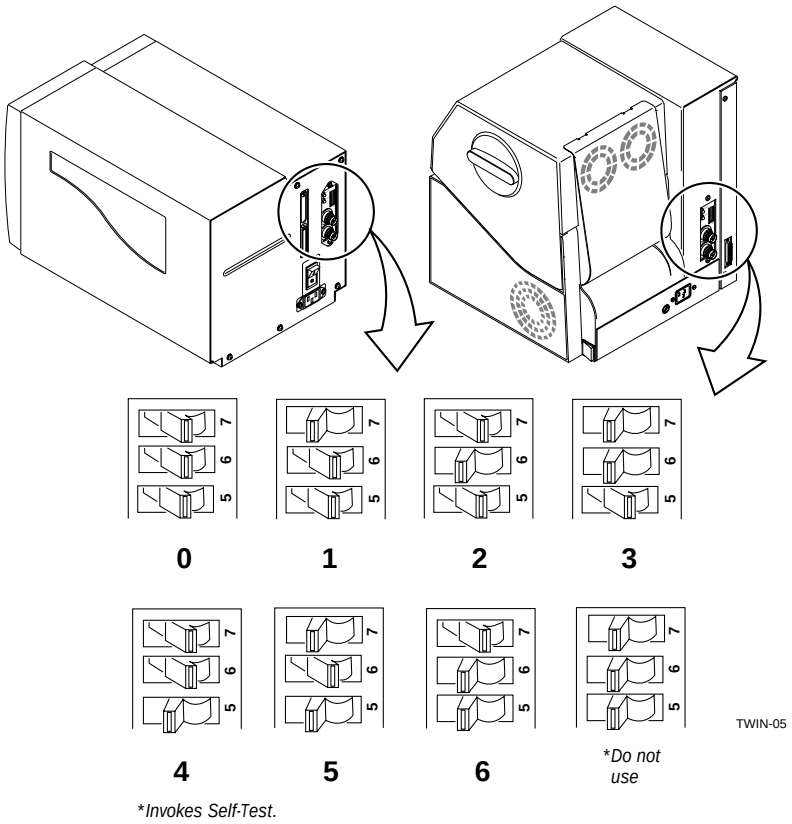
- Set the twinax address.
- Enable IBM language translation.
- Select a character set.
- Understand characters set limitations.

Setting the twinax address

This section shows you how to set the rear panel switches to change the twinax interface device address. The only tool necessary is a miniature flat-tip screwdriver (Intermec Part No. 523298).

The twinax device address is set by switches 5, 6, and 7. You can set the twinax interface address to one of seven numbers from 0 to 6. The twinax interface is shipped from the factory with the address set at zero. To select another address, determine which address is not used by another twinax device and then set the switches for that address as shown in the figure on the following page. For the changes to take effect, switch the printer power off and then on.

Setting twinax address



**Invokes Self-Test.*

Enabling IBM language translation

To work in an IBM environment, you must enable IBM language translation on your Intermec printer installed with a twinax interface. This feature allows IBM compatible characters to replace standard ASCII characters based on the current printer language. Refer to the printer commands section of your printer user's manual for the command to enable IBM language translation (<SI>i{n}) and for information on how to download it to your printer.

While running your printer with IBM language translation enabled, use the following table to find the right hex codes for the international character sets.

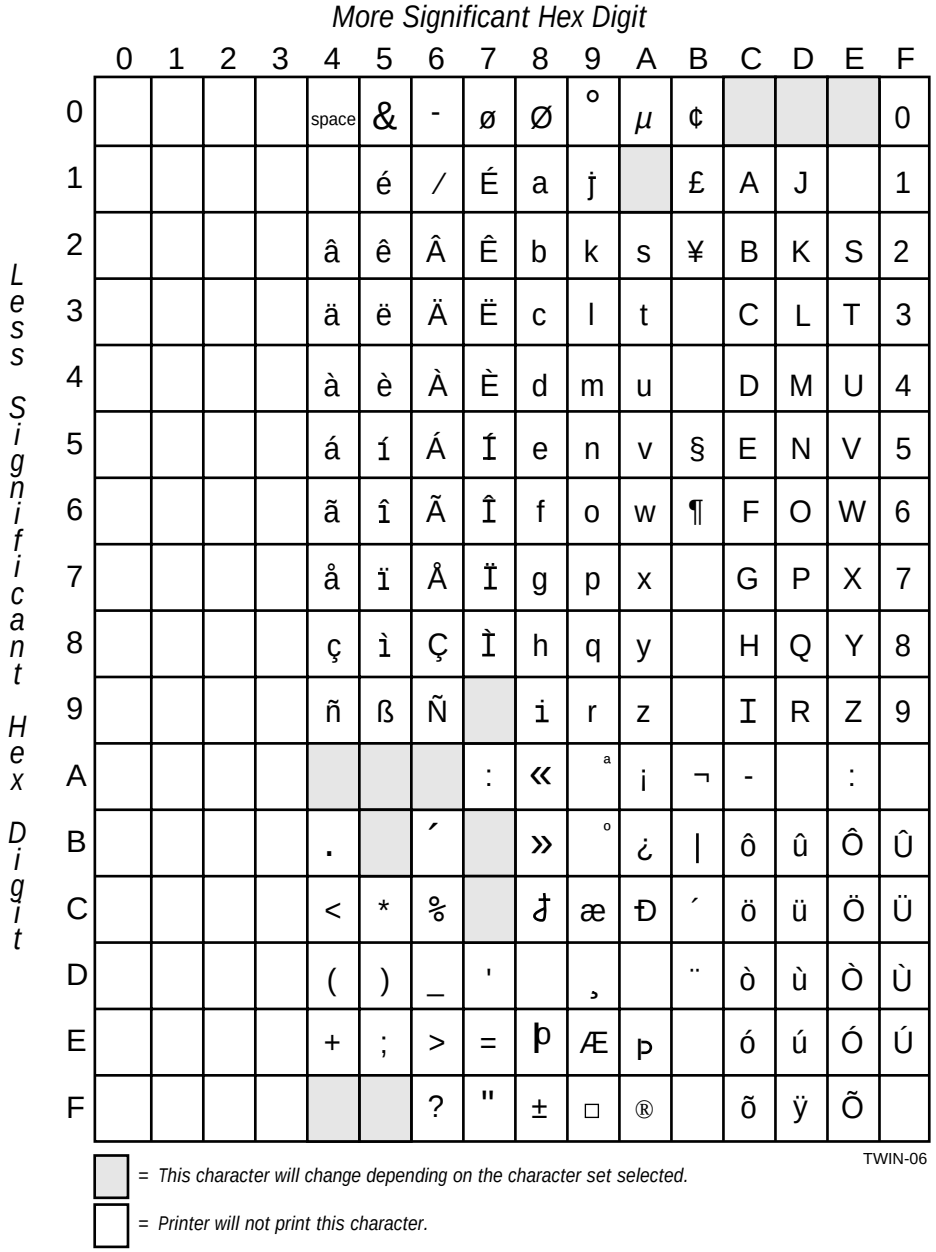
IBM translation character table

	4F	7B	5B	7C	4A	E0	5A	5F	79	C0	6A	D0	A1
U.S. ASCII	|	#	$	@	¢	\	!	¬	`	{	|	}	~
U.K. ASCII	|	#	£	@	$	\	!	¬	`	{	|	}	–
Germany	!	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
France	!	£	$	à	°	ç	§	^	`	é	ù	è	¨
Norway/Denmark	!	Æ	Å	∅	#	\	¤	^	`	æ	ϕ	å	ü
Sweden/Finland	!	Ä	Å	Ö	§	É	¤	^	é	ä	ö	å	ü
Spain	|	Ñ	₧	@	[	\	]	¬	`	{	ñ	}	¨
Italy	!	£	$	§	°	ç	é	^	ù	à	ò	è	ì

Selecting the character set

Refer to the common character set table on the following page for a complete set of characters that your Intermec printer can print. These characters remain the same no matter which language you select for printer communications. The IBM translation character table in the previous section lists the characters unique to each international character set. These characters take the place of the shaded boxes in the common character set table depending on the international character set selected. For example, if you select the German character set, the character β appears when you enter the hex code A1 from your host terminal.

Common character set



To select an international character set, refer to the printer commands section of your printer user's manual. Look for the command to select printer language (<SI>l{n}). Your printer user's manual contains details on how to select the different languages. For example, to set the printer language to Italian, send the following command: <SI>l{6}.

Understanding character set limitations

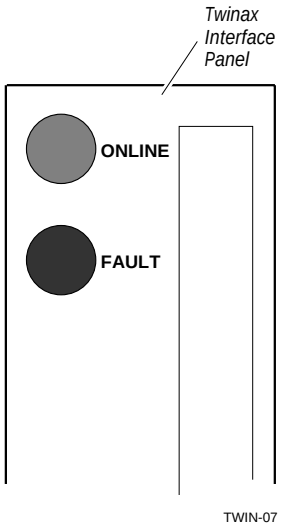
There are certain characters that are not available to you. These characters were either not available in the Intermec purchased fonts or they were not defined in the multinational character set at the time of product introduction. Your Intermec printer cannot print the following seven EBCDIC characters:

Character	Hex Code
≤	8D
↑	AD
f	B4
≠	BC
=	BF
≥	DA
ə	FA

You are now ready to try your printer with the twinax interface. Before you start, take time to learn about the status light meanings.

Status light meanings

The twinax interface rear panel contains two status lights as illustrated in the figure below. Descriptions of the two status lights, online and fault, are contained in the following paragraphs.



Online

This light illuminates when the host is communicating with the twinax interface. The online light switches off if connection with the host is lost. It flashes briefly when the printer is first powered on, but goes out until the host establishes contact.

Fault

If this light illuminates while you are operating your printer, a fault has developed that requires service. If the light pulses (comes on for one second and then goes out), the twinax interface has recorded an error in the error log. Refer to page 31 for instructions on printing the error log. If the fault light indicates that the twinax interface has failed, call your Intermec service representative for assistance. The fault light will come on or flash briefly when the printer is first powered on, but goes out a few seconds after the twinax interface establishes contact with the printer.

Testing the twinax connection

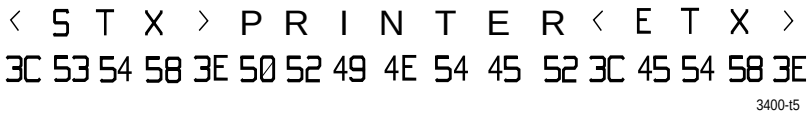
Before running a print program from the host terminal, you need to ensure that your host system is configured to operate with the twinax interface. You then need to test the connection between the twinax interface and the host computer.

Host configuration

Configure your host to recognize the twinax interface as an IBM 5256 Model 1 printer. For host configuration instructions, refer to your *IBM System Configuration Manual*.

Downloading a data file

1. Ensure the printer is powered on and active:
   - Check the printer status information at the host terminal.
   - Check that the printer power light is on, the twinax interface rear panel online light is on, and the fault light is off.
2. If you cannot power on the printer, if the fault light comes on, or if the twinax interface online light is off, check for the following:
   - Correct address set on the twinax interface.
   - Correct cabling from the twinax interface to the host.
   - Configuration of the host system to recognize the twinax interface as an IBM 5256 Model 1 printer.
3. Check for terminal-to-printer communication by entering Data Line Print mode on your printer. Refer to your printer user's manual for information on entering Data Line Print mode.
4. Send down some characters from the host. When the printer is in Data Line Print mode it does not attempt to interpret any printer commands, it simply prints each character it receives along with its hexadecimal equivalent underneath. An example of possible information is given below:



5. When your printer has successfully completed downloading information with Data Line Print, refer to your printer user's manual for information on returning to normal print mode.

If the printer responded as described in the procedure, you have successfully installed the twinax interface. Proceed to the following section entitled "Programming for the twinax interface."

If the printer failed to produce the results described in the above procedure, refer to the "Troubleshooting" section starting on page 26. If you cannot get the printer to print the sample labels after following the recommendations in "Troubleshooting," call your Intermec service representative.

Programming for the twinax interface

This section describes how to write RPG print programs for your host computer that enable the twinax interface to control printer output. An example RPG print program is provided for you. When you complete this section, you will be able to do the following:

- Understand how to send control characters to the twinax interface.
- Understand how to send label formats and data to the twinax interface.
- Understand how the twinax interface handles the erroneous messages it receives from the host.
- Write RPG print programs for your Intermec printer with a twinax interface.

Programming requirements

There are special programming requirements that you need to understand before you can send valid print messages to the printer through the twinax interface. These special requirements involve the following:

- Configuration requirements
- Control character format
- Character set limitations
- Formatting label data
- Designing labels

Your printer user's manual provides general information pertaining to these five topics. The following paragraphs provide you with supplemental information necessary for proper operation of the twinax interface.

Configuration requirements

Configure the host to recognize your Intermec printer as an IBM 5256 Model 1 printer. Instructions for doing this are provided in your *IBM System Configuration Manual.*

Control character format

Many of the printer commands are control codes. To facilitate entering and viewing of control codes at an IBM terminal, they are entered and displayed as mnemonics. The twinax interface in the printer recognizes mnemonics and converts them into control codes before passing them to the printer. The Appendix found on page 37 of this manual, provides a list of standard ASCII control character mnemonics used for composing printer messages. Refer to your printer user's manual to see how ASCII control characters are used in programming the printer.

To send a control character to the twinax interface as part of a printer message, you need to send the control character mnemonic in upper case letters bracketed by these two characters:

< >

Example: The control character to **clear format data** is represented by the mnemonic "CAN". To clear data out of image RAM, send CAN to the twinax interface in the following format:

```
<CAN>
```

(in human-readable format)

or

```
4C C3 C1 D5 6E
```

(in EBCDIC Hex format)

Some control character mnemonics, such as "FF", are only two letters in length. The mnemonic "FF" advances the printer media to the next start-of-print point. Send "FF" to the twinax interface in the following format:

```
<FF>
```

Formatting label data

All data sent to the twinax interface for printing must begin with <STX> and end with <ETX>. Any printer data not sent with these beginning and ending control character mnemonics is not printed.

Note: *The twinax interface uses the <STX> and <ETX> delimiters to determine where the printer commands begin and end. Do not enter a semicolon (;) after <STX> and <ETX>.*

Also, all data sent to the twinax interface for printing must be a valid command or a printable character. The printer ignores invalid commands and data; it substitutes a default value whenever possible, skips to the next valid command, and continues to print.

Example: The message below causes the printer to print the word "DATA". The <ETB> control character mnemonic enables the printer to print the label:

```
<STX><ESC>E0<CR>DATA<ETB><ETX>
```

The maximum print line handled by the IBM 5256 printer is 132 characters long. Your Intermec printer with the twinax interface can handle a maximum of 512 characters in one message.

Error handling

The twinax interface and your Intermec printer handle the following errors:

Type of error	Response
Host Protocol Errors	The twinax interface ignores messages containing protocol errors and records the error in the twinax interface error log. Instructions for printing the error log are on page 31.
Printer Command Errors	The printer ignores bad printer commands, substitutes default values where applicable, and continues to the next command. No errors are reported or logged.
Twinax Interface Errors	Errors that occur within the twinax interface are recorded in the twinax interface error log. An opcode error is an example of an error that occurs within the twinax interface. The error log holds the 20 most recent errors. To read the contents of the error log, refer to the instructions provided on page 31.

Common problems when printing labels

These are the five most frequently encountered problems in printing bar code labels:

- The message does not end with the printer command <ETB>.
- The program contains printer commands that the printer does not recognize. The printer ignores invalid commands and, when possible, substitutes a default value.
- The label data contains too many characters for its field on the label.
- The label is physically too small to hold the data.
- The twinax interface has not been installed and tested correctly.

Printing labels on demand from a host computer

IBM System/3X computers do not start sending data to printers until the printer file is closed. If you want to send labels that you design on a system terminal immediately to the twinax interface for printing, you must follow these guidelines:

IBM System/34 and System/36 If you are using IBM System/34 or System/36, you need to finish the RPG to close the printer file. OCL statements may be used to reload the program for the next print job.

IBM System/38 and AS/400 If you are using IBM System/38 or AS/400, you need to call a separate print program that will print the on-demand label or, after writing a label, explicitly close the printer file within the RPG program.

Label design

When you print a label with the twinax interface installed in the printer, design your label's format and data by using a label design software program or your host terminal. Refer to your printer user's manual for information on label design at the host terminal.

Example print program

The following pages provide an example RPG print program for the AS/400. The next few paragraphs provide you with details about the RPG print program.

File specifications The file specifications used in the RPG example program are identical to those used for the IBM 5256 printer.

Extension specification The extension specification defines a compile time array named FMT. The FMT array contains the label format.

Calculations specifications Miscellaneous label fields and printer control characters are initialized by the calculation specifications. The calculation specifications also contain the FORMAT subroutine used to send the label format to the twinax interface.

About the RPG example print program

After compiling these programs, called DEM44C, a display screen appears warning you about having the correct print file and outque. If necessary, change DEM44C.

The display screen requires a user name. Enter your name and press the ENTER key. The screen blanks out and a label prints. Use the CMD KEY 3 to exit the program.

***Note**: The following program contains X's in place of a printer model number. Please insert the model number of your printer in place of the X's.*

RPG example print program

```
                                I N T E R M E C
                              PRINTER DEMONSTRATION
                                                                  DEM44D

THIS PROGRAM WILL SHOW YOU HOW TO PRINT TO AN OUTQUE ON THE IBM AS/400.  WE ARE USING
QPRINT AS THE OUTPUT FILE AND PRT01 AS THE OUTQUE.  IF YOU DO NOT HAVE EITHER OR BOTH,
PLEASE STOP AND CHANGE THE CLP PROGRAM DEM44C.
```

CLP program

```
   /*                                                              */
   /*   PROGRAM:  DEM44C                                           */
   /*                                                              */
            PGM
            OVRPRTF    FILE(QPRINT) OUTQ(PRT01)
            CALL       PGM(DEM44R)
            DLTOVR     FILE(QPRINT)
            ENDPGM
```

Display program

```
A*
A*   PROGRAM:  DEM44D
A*
A                                      DSPSIZ(24 80 *DS3)
A                                      MSGLOC(23)
A                                      PRINT
 ************************************
A          R SCRN01
 **********************
A                                        CF03(03 'END OF JOB')
A                                     1 32'I N T E R M E C'
A                                        DSPATR(HI)
A                                     2  3DATE EDTCDE(Y)
A                                     2 68'DEM44D'
A                                     3  3TIME EDTWRD('0 :  :  ')
A                                     3 31'XXXX DEMONSTRATION'
A                                        DSPATR(HI)
A                                     6 16'THIS PROGRAM WILL SHOW HOW TO -
A                                        PRINT TO AN OUTQUE'
A                                     8 16'ON THE IBM AS/400.  WE ARE USING -
A                                        QPRINT AS THE '
A                                    10 16'OUTPUT FILE AND PRT01 AS THE OUT-
A                                        QUE.  IF YOU DO'
A                                    12 16'NOT HAVE EITHER OR BOTH, PLEASE -
A                                        STOP AND CHANGE'
A                                    14 16'THE CLP PROGRAM DEM44C.'
A                                    17 14'PLEASE ENTER YOUR NAME:'
A            NAME          25   B 17 40
A  80                                    ERRMSG('NAME CAN NOT BE LEFT BLANK'-
A                                         80)
A                                    23 30'CMD 3: END OF JOB'
```

RPG program

```
H        1                                                              DEM44R
 *
 *  PROGRAM NAME:  DEM44R
 *
 *  DESCRIPTION:   THIS PROGRAM WILL DEMONSTRATE THE XXXX PRINTER
 *
FDEM44D  CF  E                    WORKSTN
FQPRINT  O   F     132     OF     PRINTER
 *
E                    INIT    1  10 80
E                    WRK        80  1
E                    QRX       125  1
 *
I            DS
I                                       1  80 CMDQ
I                                      27  36 QUEUE
 *
 ***  INITIALIZE VALUES **
 *
C                     MOVE '1'       ON      1
C                     MOVE '0'       OFF     1
C                     MOVE 'Y'       YES     1
C                     MOVE 'N'       NO      1
C                     Z-ADD1         AX      30
 *
```

```
 ***  INITIALIZE FOR DATA DOWNLOAD
 *
C                     MOVE '<CR>'    QCR     4
C                     MOVE '<ETB>'   QETB    5
C                     MOVE '<ESC>'   QESC    5
C                     MOVE '<CAN>'   QCAN    5
C                     MOVE '<STX>'   QSTX    5
C                     MOVE '<ETX>'   QETX    5
C                     MOVE '<RS>'    QRS     4
C                     MOVE '<FS>'    QFS     4
C                     MOVE '<US>'    QUS     4
C                     MOVEL'<ESC>'   QKINC1  7
C                     MOVE 'I1'      QKINC1
C                     MOVEL'<ESC>'   QKDEC1  7
C                     MOVE 'D1'      QKDEC1
 *
 ***  DOWNLOAD FORMAT TO OUTQUE  **
 *
C                     EXSR DLOADQ
 *
 ****************************************************
 **                  MAINLINE LOGIC                **
 ****************************************************
 *
C                     MOVE 'A'       FUNCTN  1
 *
C           FUNCTN    DOWNE'Z'
C           FUNCTN    CASEQ'A'       SCRN1
C                     END
C                     END
 *
C                     SETON                     LR
 *************************
 *
 ****************************************************
 **  SCRN1 - PROMPT SCREEN                         **
 ****************************************************
 *
C           SCRN1     BEGSR
 *
C                     EXFMTSCRN01
 *
C           *IN03     IFEQ ON
C                     MOVE 'Z'       FUNCTN
C                     ELSE
C                     EXSR EDIT01
 *
C           ERR       IFEQ NO
C                     EXSR LABELQ
C                     MOVE *BLANKS   NAME
C                     END
 *
C                     END
 *
C                     ENDSR
 *************************
 *
 ****************************************************
 **  EDIT01 - EDITS THE PROMPT SCREEN FIELD        **
 ****************************************************
 *
C           EDIT01    BEGSR
 *
```

```
C                     MOVE OFF       *IN80
C                     MOVE NO        ERR     1
 *
C           NAME      IFEQ *BLANKS
C                     SETON                    80
C                     MOVE YES       ERR
C                     END
 *
C                     ENDSR
 *************************
 *
 ******************************************************
 **  DLOADQ - DOWNLOAD TO PRINTER OUTQ SUB-ROUTINE  **
 ******************************************************
 *
C           DLOADQ    BEGSR
 *
 *   LINES IN THE <INIT> ARRAY:
C                     Z-ADD10        MXRD    30
 *
 *   SET-UP CHANNEL CODE & <ESC> CHARACTER
C                     Z-ADD1         AX
C                     MOVE *BLANKS   QRX
C                     MOVEAQESC      QRX,AX
C                     ADD  5         AX
 *
 *   OUTPUT ALL <INIT> ARRAY PRINTER STATEMENTS TO PRINTER
C           1         DO   MXRD      BX      30
C                     MOVEA*BLANKS   WRK
C                     MOVEAINIT,BX   WRK
C                     Z-ADD80        CX      30
 *
C           WRK,CX    DOWEQ' '
C                     SUB  1         CX
C                     END
 *
C           120       SUB  AX        TMP     30
C                     ADD  1         TMP
C           TMP       IFLT CX
C                     EXCPTPRINTQ
C                     MOVE *BLANKS   QRX
C                     Z-ADD1         AX
C                     END
 *
C                     MOVEAINIT,BX   QRX,AX
C                     ADD  CX        AX
C                     END
 *
C                     EXCPTPRINTQ
 *
C                     ENDSR
 *************************
 *
 ******************************************************
 **  SETUPQ  SET-UP OUTPUT ARRAY FOR PRINT QUEUE    **
 ******************************************************
 *
C           SETUPQ    BEGSR
 *
C                     Z-ADD1         AX
C                     MOVEA*BLANKS   QRX
 *
C                     ENDSR
```

```
     *************************
     *
     ****************************************************
     **  LABELQ - PRINT LABEL SUBROUTINE (PRINT QUEUE)  **
     ****************************************************
     *
    C           LABELQ    BEGSR
     *
    C                     EXSR SETUPQ
    C                     MOVEAQESC      QRX,AX
    C                     ADD  5         AX
    C                     MOVEA'E3'      QRX,AX
    C                     ADD  2         AX
    C                     MOVEAQCAN      QRX,AX
    C                     ADD  5         AX
    C                     MOVEAQCR       QRX,AX
    C                     ADD  4         AX
    C                     MOVEANAME      QRX,AX
    C                     ADD  20        AX
    C                     MOVEAQCR       QRX,AX
    C                     ADD  4         AX
    C                     MOVEAQETB      QRX,AX
    C                     ADD  5         AX
    C                     MOVEAQETX      QRX,AX
    C                     EXCPTPRINQQ
     *
    C                     ENDSR
     *************************
     *
     ****************************************************
     ** OUTPUT SPECIFICATIONS                          **
     ****************************************************
    OQPRINT  E               PRINTQ
    O                        QSTX    +  0
    O                        QRX     +  0
    O                        QETX     131
    O        E               PRINQQ
    O                        QSTX    +  0
    O                        QRX     +  0
     ******************************************
** INIT - LABEL FORMAT **
P;E3;F3;H0;
H1;o050,050;c2;w2;h3;d3,INTERMEC;
H2;o075,100;c2;w1;h1;d3,Presents the;
H3;o115,125;c2;w1;h2;d3,MODEL;
H4;o075,165;c2;w1;h2;d3,XXXX PRINTER;
B5;o082,200;c0,0;f0;h35;w1;i1;d3, XXXX ;
I5;o113,238;c0;w1;h1;
H6;o135,255;c2;w1;h1;d3,to;
H7;o050,285;c2;w1;h2;d0,20;
R
```

Troubleshooting

This section describes functional problems that you may encounter with the twinax interface and possible solutions.

Problem: The amber fault light comes on and goes out after one second.

This indicates that the twinax interface has recorded an error message in its error log. To see if the twinax interface is recording error messages in its error log, watch the rear panel fault light as the host transmits a message to the twinax interface. To print the contents of the error log, follow the directions starting on page 31. The error log may tell you where to look for the problem: it may be located between the host and the twinax interface, between the twinax interface and the printer, or inside the twinax interface.

Problem: The amber fault light continually flashes.

This indicates that the twinax interface PCB assembly has failed its power-on test. When the printer is first switched on, the twinax interface runs a set of tests to verify that the RAM and ROM on the twinax interface PCB assembly are functioning correctly and that the twinax interface can communicate with the printer. The fault light flashes and the twinax interface ceases to function if a failure is detected.

The fault light emits flashes to indicate where the problem is located:

No. of flashes	Problem
1	ROM checksum error
2	RAM error
3	Biphase Communications Processor (BCP) shared RAM error
4	BCP instruction RAM error
5	BCP internal loopback test timeout
6	BCP internal loopback test error
7	Printer interface error

***Note**: The fault light will flash anywhere from one to seven times, pause, and then repeat the process until whatever caused the error is corrected.*

Switch the printer power off and then on. If the fault light still flashes, call for service.

Problem: The amber fault light comes on and stays on.

This indicates that the twinax interface PCB assembly has failed and is no longer functioning. In this situation, call for service.

Problem: The green online light stays on or flickers as it should, but the printer does not print.

This indicates that the connection between the host and the twinax interface is good, but that the host is sending bad printer commands. Check the printer commands for errors. Correct any error you find and try again. If the printer still does not print, try examining the data the twinax interface is receiving from the host. Refer to "Printing unprocessed data" on page 33 for more information.

Problem: The green online light goes out and the twinax interface stops communicating with your host system.

This problem has several possible causes:

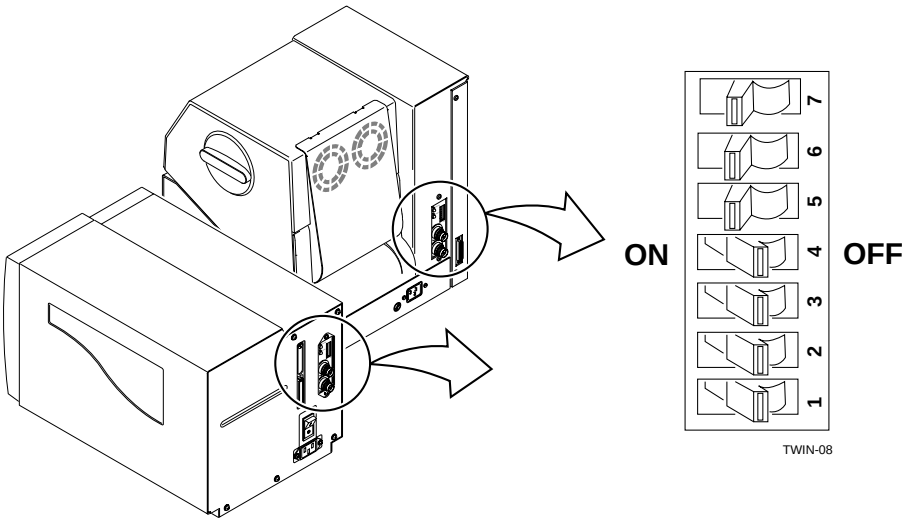
- The twinax cable has become disconnected. Check twinax cable connections at the host and all twinax devices including the printer twinax interface.
- The twinax cable has been terminated before the end of the cable or has been unterminated. Check the last twinax device for proper termination; check all other twinax devices to see that they are unterminated.
- Another twinax device has the same address as the printer twinax interface. Check addresses of all other twinax devices (especially those added after the printer twinax interface). Change addresses that conflict with the printer twinax interface.
- The host has broken off communications with the twinax interface. Check the program and the host configuration, making certain that the host is ignoring the twinax interface.

Twinax interface self-test

Use the twinax interface self-test to determine whether the twinax interface has been installed correctly or whether it is faulty. To run the twinax interface self-test, complete the following procedure:

1. Turn the printer off and disconnect the twinax interface cable.
2. Set switches 5 through 7 to the ON position and set switches 1 through 4 to the OFF position. Refer to the following figure for an illustration of the switch settings.

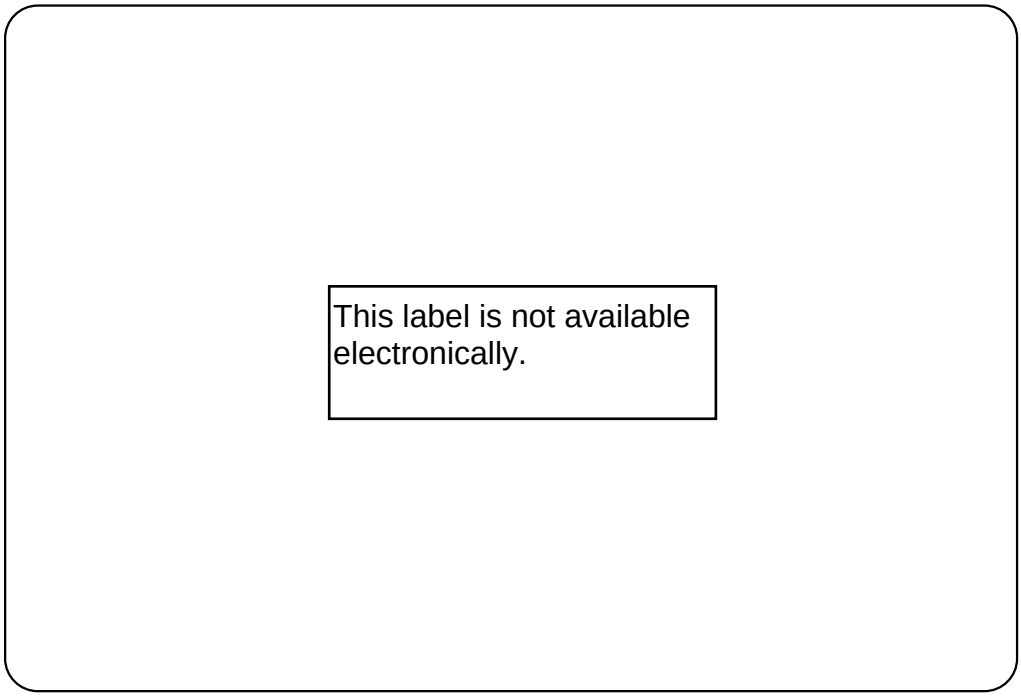
Twinax interface self-test switch settings



3. Turn the printer on.

4. The printer continuously prints the twinax interface test label shown in the figure below.

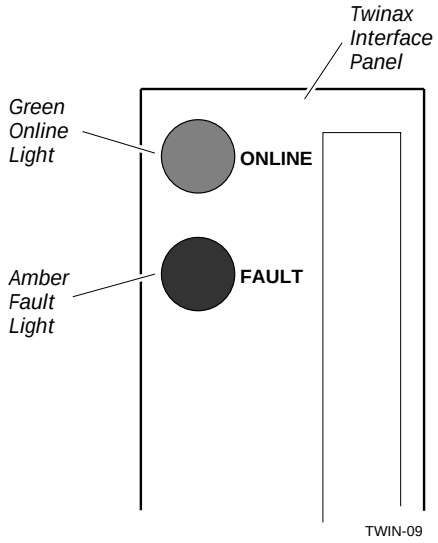
Twinax interface self-test label



5. After printing six labels, refer to your printer user's manual for directions on how to stop the printer from printing labels. You may need to press the printer front control panel key or a front panel button.

6. Look at the two lights on the twinax interface rear panel. Both the green light and the amber light should be off. If either light is on or flashing, the twinax interface has failed its self-test and must be repaired or replaced. Please call your Intermec service representative.

Twinax interface rear panel lights



***Note**: The green light is OFF because the twinax interface is not connected to the host.*

7. If the twinax interface passed the self-test, return the switches to their original setting.
8. Install the twinax interface cable, turn the printer on, and resume normal operation.

Printing the error log

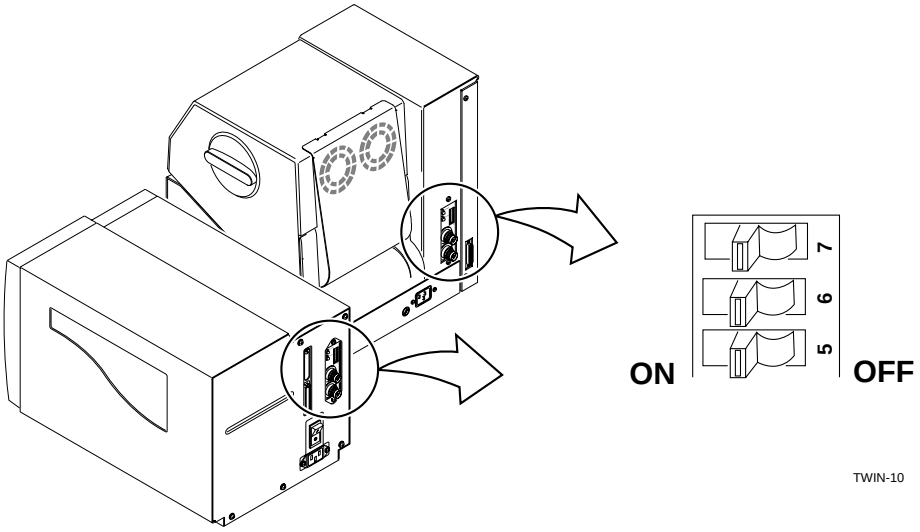
A buffer in the twinax interface called the error log stores the last 20 recorded errors. When more than 20 error messages accumulate, the first error message stored is deleted and the new message is added. The accumulated errors report the occurrence of bad commands received over the twinax system cable, errors communicating with the printer, or errors the twinax interface encounters while executing its own code.

Printing the contents of the error log may help you troubleshoot problems by showing you where to look for errors. However, if you cannot determine the cause of the problem, call for service.

To print and interpret the contents of the error log:

1. Record the setting of the twinax interface rear panel switches; you need to know how to set the switches after testing is complete.
2. Without switching off the printer power, set switches 5 through 7 to the ON position as shown in the figure below. At this point, the printer ignores incoming messages from the host.

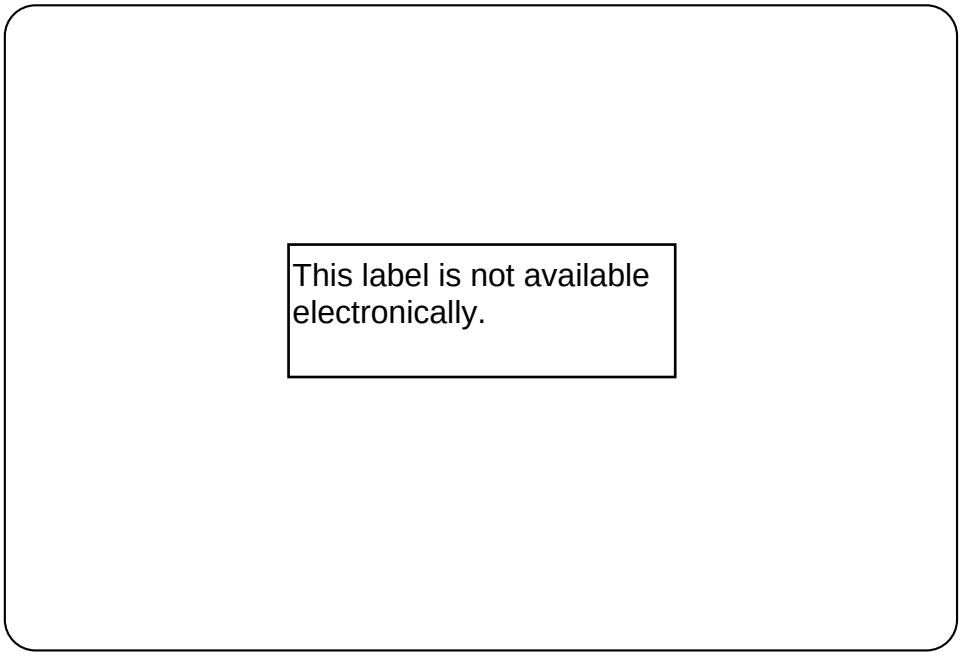
Print error log switch settings



3. The printer starts printing the contents of the error log, one error per label. It prints errors in the order they are received by the printer, starting with the newest and ending with the oldest. The error label is shown in the following figure.

Note: *The error log will not record errors in printer commands. The error log is erased when it is printed.*

Error log label



4. After the printer stops printing error labels, set the twinax interface rear panel switches back to the original setting you recorded in Step 1.

Examine your error log labels. Each one has a number and a brief description. The errors fall into three categories:

Error #100 - #499. Twinax interface-to-printer CPU error. This type of error may be caused by faulty installation of the twinax interface or by errors generated by the twinax interface that you cannot correct. If you cannot determine the cause of the problem, call for service.

Error #500 - #699. Host-to-twinax interface error. This is a protocol error. Usually correcting the program or the host configuration will remedy this situation.

Error #700 - #999. Internal error. This type of error is not correctable by the user. Call for service.

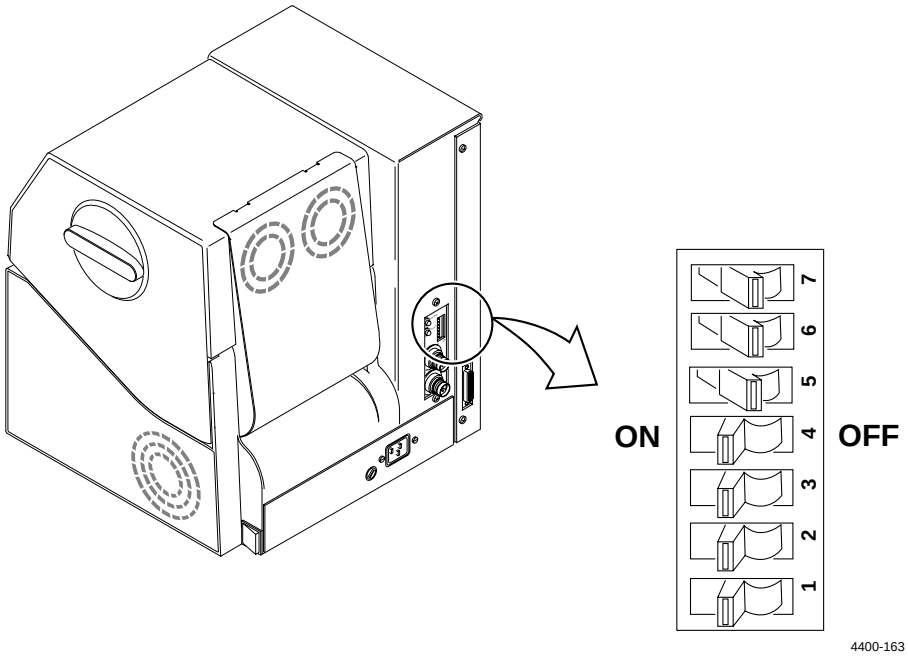
Printing unprocessed data

Printing unprocessed data may help you troubleshoot problems by showing how the twinax interface handles data sent from the host. However, if you cannot determine the cause of the problem, call for service.

Data from the host is filtered through several stages of processing before being sent to the printer. You can print data from two of these stages. The following procedure instructs you to first print data from one of the early stages of processing (stage 1) and then from the final stage of processing (stage 2).

1. Enter Data Line Print mode on your printer. Refer to your printer user's manual for the procedure to enter Data Line Print mode. The printer enters a state in which it prints every character it receives (including ASCII control characters) with the matching hexadecimal code underneath.
2. Record the setting of the twinax interface rear panel switches; you need to know how to set the switches after testing is complete.
3. Without switching off the printer, set switches 1 through 4 to the ON position and switches 5 through 7 to the OFF position as shown in the following figure.

Printing stage one unprocessed data switch settings



4. Send some printer commands (data) down from the host. The printer starts printing each character that is not filtered out at this stage by the twinax interface.

   At this stage in the processing, all of the host protocol characters are removed and the EBCDIC code has been converted to ASCII code. Here is what you might expect to see on the labels:

- The first five characters are the printer command string delimiter <STX>. If <STX> is missing, the printer will not respond to any commands. Characters before <STX> are filtered out.
- The next characters you see are printer commands and data. Here are some examples:

```
<  U  S  >  1  ;  H  0  ;  ▫  0  ,  4  0  ;
3C 55 53 3E 31 3B 48 30 3B 6F 30 2C 34 30 3B
```

3400-t2

The final characters of the printer command string form the Print command:

```
<  E  T  B  >  ;
3C 45 54 42 3E 3B
```

3400-t3

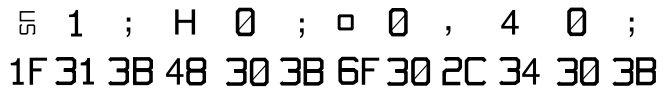
Look for invalid printer commands or incorrect syntax within the printer command string.

- The last five characters printed are the final delimiter of the printer command string <ETX>. If <ETX> is missing, no data will be sent to the printer from the twinax interface. Characters following <ETX> are filtered out.

5. Print the data from the final stage of processing. Without switching off the printer, set the twinax interface rear panel switches back to the original setting you recorded in Step 2.
6. Run the print program on the host. The printer prints each character that is not filtered out by the twinax interface.

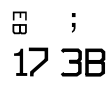
   At this stage in the processing, all the host protocol characters have been removed, the EBCDIC code has been converted to ASCII code, the ASCII control code mnemonics have been converted to actual ASCII control codes, and characters outside of printer command delimiters have been filtered out. There should not be any characters other than the printer commands. If you see any characters that are not printer commands, you should suspect they are causing printing problems.

Here are some examples of printer commands:



3400-t1

The last characters of the printer command string form the Print command:



3400-t4

Within the printer commands, look for invalid printer commands or incorrect syntax.

7. If there is no printout, suspect the host of transmitting illegal characters that are inhibiting processing of data during the final stage. Go back and examine the printout from the earlier stage of processing. There you should be able to find characters that are causing the problem.
8. After you have completed the test, refer to your printer user's manual for information on how to return to normal operation.

If you cannot solve your printing problems, call Intermec for service.

Appendix

ASCII control characters

Character value	Definition	ASCII hex
NUL	NULL	00
SOH	START OF HEADING	01
STX	START OF TEXT	02
ETX	END OF TEXT	03
EOT	END OF TRANSMISSION	04
ENQ	ENQUIRY	05
ACK	ACKNOWLEDGE	06
BEL	BELL	07
BS	BACKSPACE	08
HT	HORIZONTAL TAB	09
LF	LINE FEED	0A
VT	VERTICAL TAB	0B
FF	FORM FEED	0C
CR	CARRIAGE RETURN	0D
SO	SHIFT OUT	0E
SI	SHIFT IN	0F
DLE	DATA LINK ESCAPE	10
DC1	DEVICE CONTROL 1	11
DC2	DEVICE CONTROL 2	12
DC3	DEVICE CONTROL 3	13
DC4	DEVICE CONTROL 4	14
NAK	NEGATIVE ACKNOWLEDGE	15
SYN	SYNCHRONOUS IDLE	16
ETB	END TRANSMISSION BLOCK	17
CAN	CANCEL	18
EM	END OF MEDIUM	19
SUB	SUBSTITUTE	1A
ESC	ESCAPE	1B
FS	FILE SEPARATOR	1C
GS	GROUP SEPARATOR	1D
RS	RECORD SEPARATOR	1E
US	UNIT SEPARATOR	1F
SP	SPACE	20
DEL	DELETE	7F

Twinax jumper configuration

The following is a list of jumpers resident on the coax and twinax cards.

Jumper	Function
J5-1 to J5-2	Processor clock enable
J7-1 to J7-2	Personality select, coax I/O
J7-2 to J7-3	Personality select, twinax I/O
J8-1 to J8-2	Bypass capacitor for coax cable
J9-1 to J9-2	8K processor SRAM select
J9-2 to J9-3	32K processor SRAM select
J10-1 to J10-2	Host select, 4400
J10-2 to J10-3	Host select, test
J10-2 to J10-4	Host select, 3000A
J11-1 to J11-2	8K I/O processor data SRAM select
J11-2 to J11-3	32K I/O processor data SRAM select
J16-1 to J16-2	8K I/O processor CODE SRAM select
J16-2 to J16-3	32K I/O processor CODE SRAM select

Twinax defaults

J5-1 to J5-2
J7-2 to J7-3
J9-1 to J9-2 (hardwired, no jumper required)
J10-1 to J10-2
J11-1 to J11-2 (hardwired, no jumper required)
J16-1 to J16-2 (hardwired, no jumper required)

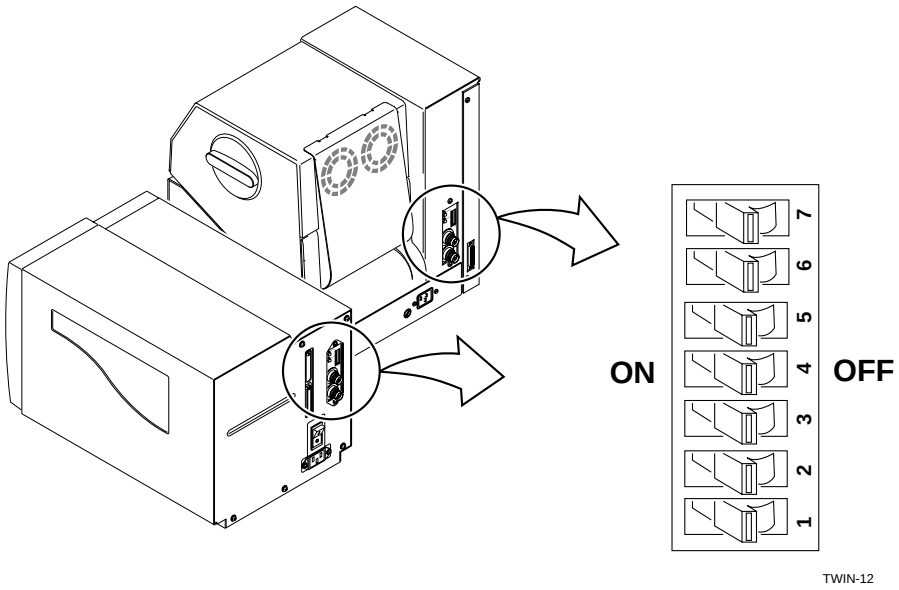
Factory switch settings

Seven miniature toggle switches and one slide switch are provided on the rear panel of the twinax interface. Three of the seven miniature toggle switches set the twinax address and enable the twinax self-test. The slide switch terminates the twinax cable.

The switches are numbered 1 through 7 counting from bottom to top. The switches are easily set ON or OFF with a miniature flat-tip screwdriver (Intermec Part No. 523298). For the switch settings to take effect, switch the printer power off and then on. The twinax interface is shipped with the seven switches set to the OFF position as shown in the figure below.

With the seven switches set to the OFF position (factory settings), the twinax address is 0 (zero) and the self-test is disabled.

Factory setting of twinax switches



Setting the twinax rear panel switches

Address	Switch settings (switches 5, 6, and 7)
0	000
1	001
2	010
3	011
4	100
5	101
6	110
Self-Test	
Self-Test On	111

***Note**: For switch setting changes to take effect, switch the printer off and then on.*

EBCDIC - ASCII code conversion table

EBCDIC			ASCII		
Bits 7654 3210	Hex code	Graphic	Graphic	Hex code	Bits 654 3210
0000 0000	00	NUL	NUL	00	000 0000
0000 0001	01	SOH	SOH	01	000 0001
0000 0010	02	STX	STX	02	000 0010
0000 0011	03	ETX	ETX	03	000 0011
0000 0101	05	HT	HT	09	000 1001
0000 0111	07	DEL	DEL	7F	111 1111
0000 1011	0B	VT	VT	0B	000 1011
0000 1100	0C	FF	FF	0C	000 1100
0000 1101	0D	CR	CR	0D	000 1101
0000 1110	0E	SO	SO	0E	000 1110
0000 1111	0F	SI	SI	0F	000 1111
0001 0000	10	DLE	DLE	10	001 0000
0001 0001	11	DC1	DC1	11	001 0001
0001 0010	12	DC2	DC2	12	001 0010
0001 0011	13	DC3	DC3	13	001 0011
0001 0110	16	BS	BS	08	000 1000
0001 1000	18	CAN	CAN	18	001 1000
0001 1001	19	EM	EM	19	001 1001
0001 1100	1C or 22	FS	FS	1C	001 1100
0001 1101	1D or 30	GS	GS	1D	001 1101
0001 1110	1E or 35	RS	RS	1E	001 1110
0001 1111	1F, 31, or 36	US	US	1F	001 1111
0010 0101	25	LF	LF	0A	000 1010
0010 0110	26	ETB	ETB	17	001 0111
0010 0111	27	ESC	ESC	1B	001 1000
0010 1101	2D	ENQ	ENQ	05	000 0101
0010 1110	2E	ACK	ACK	06	000 0110
0010 1111	2F	BEL	BEL	07	000 0111

EBCDIC - ASCII code conversion table (continued)

EBCDIC			ASCII		
Bits 7654 3210	Hex code	Graphic	Graphic	Hex code	Bits 654 3210
0011 0010	32	SYN	SYN	16	001 0110
0011 0111	37	EOT	EOT	04	000 0100
0011 1100	3C	DC4	DC4	14	001 0100
0011 1101	3D	NAK	NAK	15	001 0101
0011 1111	3F	SUB	SUB	1A	001 1010
0100 000	40	Sp	Sp	20	010 0000
0100 1010	4A	.	.	5B	101 1011
0100 1011	4B	[	[	2E	010 1110
0100 1100	4C	<	<	3C	011 1100
0100 1101	4D	(	(	28	010 1000
0100 1110	4E	+	+	2B	010 1011
0100 1111	4F	!	!	21	010 0001
0101 0000	50	&	&	26	010 0110
0101 1010	5A	]	]	5D	101 1101
0101 1011	5B	$	$	24	010 0100
0101 1100	5C	*	*	2A	010 1010
0101 1101	5D	)	)	29	010 1001
0101 1110	5E	;	;	3B	011 1011
0101 1111	5F	^	^	5E	101 1110
0110 0000	60	-	-	2D	010 1101
0110 0001	61	/	/	2F	010 1111
0110 1010	6A	|	|	7C	111 1100
0110 1011	6B	,	,	2C	010 1100
0110 1100	6C	%	%	25	010 0101
0110 1101	6D	_	_	5F	101 1111
0110 1110	6E	>	>	3E	011 1110
0110 1111	6F	?	?	3F	011 1111

EBCDIC - ASCII code conversion table (continued)

EBCDIC			ASCII		
Bits 7654 3210	Hex code	Graphic	Graphic	Hex code	Bits 654 3210
0111 1001	79	`	`	60	110 0000
0111 1010	7A	:	:	3A	011 1010
0111 1011	7B	#	#	23	010 0011
0111 1100	7C	@	@	40	100 0000
0111 1101	7D	'	'	27	010 0111
0111 1110	7E	=	=	3D	011 1101
0111 1111	7F	"	"	22	010 0010
1000 0001	81	a	a	61	110 0001
1000 0010	82	b	b	62	110 0010
1000 0011	83	c	c	63	110 0011
1000 0100	84	d	d	64	110 0100
1000 0101	85	e	e	65	110 0101
1000 0110	86	f	f	66	110 0110
1000 0111	87	g	g	67	110 0111
1000 1000	88	h	h	68	110 1000
1000 1001	89	i	i	69	110 1001
1001 0001	91	j	j	6A	110 1010
1001 0010	92	k	k	6B	110 1011
1001 0011	93	l	l	6C	110 1100
1001 0100	94	m	m	6D	110 1101
1001 0101	95	n	n	6E	110 1110
1001 0110	96	o	o	6F	110 1111
1001 0111	97	p	p	70	111 0000
1001 1000	98	q	q	70	111 0001
1001 1001	99	r	r	72	111 0010

EBCDIC - ASCII code conversion table (continued)

EBCDIC			ASCII		
Bits 7654 3210	Hex code	Graphic	Graphic	Hex code	Bits 654 3210
1010 0001	A1	~	~	7E	111 1110
1010 0010	A2	s	s	73	111 0011
1010 0011	A3	t	t	74	111 0100
1010 0100	A4	u	u	75	111 0101
1010 0101	A5	v	v	76	111 0110
1010 0110	A6	w	w	77	111 0111
1010 0111	A7	x	x	78	111 1000
1010 1000	A8	y	y	79	111 1001
1010 1001	A9	z	z	7A	111 1010
1100 0000	C0	{	{	7B	111 1011
1100 0001	C1	A	A	41	100 0001
1100 0010	C2	B	B	42	100 0010
1100 0011	C3	C	C	43	100 0011
1100 0100	C4	D	D	44	100 0100
1100 0101	C5	E	E	45	100 0101
1100 0110	C6	F	F	46	100 0110
1100 0111	C7	G	G	47	100 0111
1100 1000	C8	H	H	48	100 1000
1100 1001	C9	I	I	49	100 1001
1101 0000	D0	}	}	7D	111 1101
1101 0001	D1	J	J	4A	100 1010
1101 0010	D2	K	K	4B	100 1011
1101 0011	D3	L	L	4C	100 1100
1101 0100	D4	M	M	4D	100 1101
1101 0101	D5	N	N	4E	100 1110
1101 0110	D6	O	O	4F	100 1111
1101 0111	D7	P	P	50	101 0000
1101 1000	D8	Q	Q	51	101 0001
1101 1001	D9	R	R	52	101 0010

EBCDIC - ASCII code conversion table (continued)

EBCDIC			ASCII		
Bits 7654 3210	Hex code	Graphic	Graphic	Hex code	Bits 654 3210
1110 0000	E0	\	\	5C	101 1100
1110 0010	E2	S	S	53	101 0011
1110 0011	E3	T	T	54	101 0100
1110 0100	E4	U	U	55	101 0101
1110 0101	E5	V	V	56	101 0110
1110 0110	E6	W	W	57	101 0111
1110 0111	E7	X	X	58	101 1000
1110 1000	E8	Y	Y	59	101 1001
1110 1001	E9	Z	Z	5A	101 1010
1111 0000	F0	0	0	30	011 0000
1111 0001	F1	1	1	31	011 0001
1111 0010	F2	2	2	32	011 0010
1111 0011	F3	3	3	33	011 0011
1111 0100	F4	4	4	34	011 0100
1111 0101	F5	5	5	35	011 0101
1111 0110	F6	6	6	36	011 0110
1111 0111	F7	7	7	37	011 0111
1111 1000	F8	8	8	38	011 1000
1111 1001	F9	9	9	39	011 1001

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